

**ORDERED TWO-PHASE DIELECTRIC FILM, AND
SEMICONDUCTOR DEVICE CONTAINING THE SAME**

ABSTRACT OF THE DISCLOSURE

5 A porous, low-k dielectric film that has good mechanical properties as well as a
method of fabricating the film and the use of the film as a dielectric layer between
metal wiring features are provided. The porous, low-k dielectric film includes a first
phase of monodispersed pores having a diameter of from about 1 to about 10 nm that
are substantially uniformly spaced apart and are essentially located on sites of a three-
10 dimensional periodic lattice; and a second phase which is solid surrounding the first
phase. Specifically, the second phase of the film includes (i) an ordered element that is
composed of nanoparticles having a diameter of from about 1 to about 10 nm that are
substantially uniformly spaced apart and are essentially arranged on sites of a three-
dimensional periodic lattice, and (ii) a disordered element comprised of a dielectric
15 material having a dielectric constant of about 2.8 or less.